

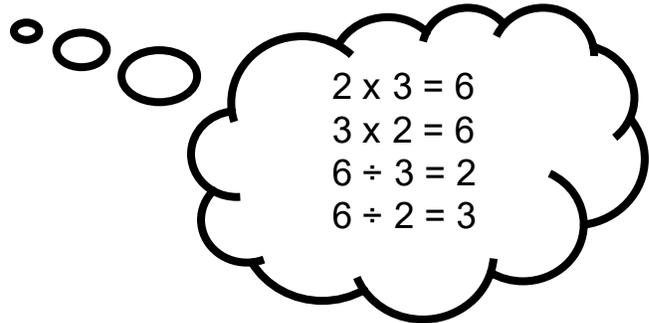
The teaching of multiplication in Chaddlewood Primary School



This calculation policy outlines the progression in mathematical strategies and skills from Foundation to Year 6, and the typical year group children will be in when they are first introduced to particular concepts. This calculation policy is to be used flexibly, as children in each year group may draw from year groups above and below their own, according to their ability.

It is essential that, in all year groups, multiplication is:

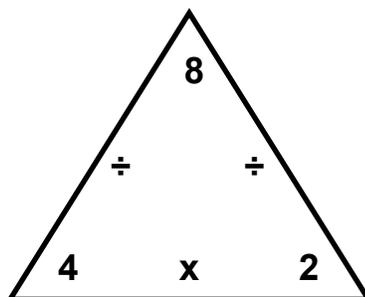
- taught alongside its inverse division, as these important links will assist children in mastering the operation.
- involved in situations with rich problem solving activities and word problems.
- approached in a cross curricular manner wherever possible.



Children will be given many different types of problems, often which will look very different to what they are used to. This is true for all of the mathematical strategies throughout the calculation policy. For example, in calculating problems involving a missing number (for example $4 \times 3 = \square$), children will also consider:

$$\square \times 3 = 12 \quad 4 \times \square = 12 \quad 12 = 3 \times \square \quad 12 = \square \times 4$$

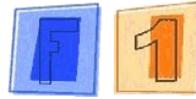
To help to develop the links between multiplication and division the children will also use 'number trios'. Number trios demonstrate to the children that when they choose a 'trio', they can make four number sentences with them, by covering up particular numbers. These will be used even further by considering what would happen if we multiplied or divided each of the numbers by 10 or 100.



$$\begin{aligned} 2 \times 4 &= 8 \\ 4 \times 2 &= 8 \\ 8 \div 4 &= 2 \\ 8 \div 2 &= 4 \end{aligned}$$

Strategy

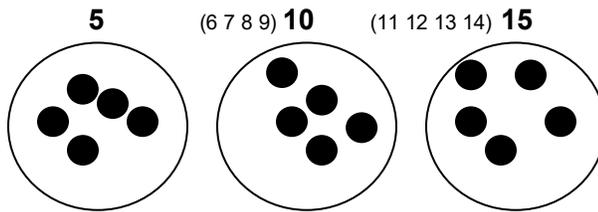
Adding groups by using equipment



Multiplication is introduced through problems involving 'lots of' objects.

Example

3 lots of 5 = □



Rationale

Children will physically make sets or groups, and then add them together by counting up from 1 (until all of the objects have been used).

Adding groups

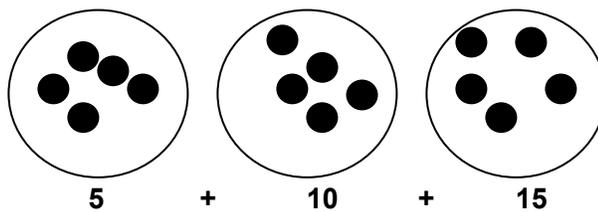


The multiplication sign (x) will be introduced as a short way of saying 'lots of'.

Example

$5 \times 3 = \square$

There are 5 buns on a plate.
How many buns are on 3 plates?



Please note that the number sentence '5x3' is read '3 lots of 5'.

Dots are often drawn in groups.

This shows how many 'lots of' there are. These groups are then added together

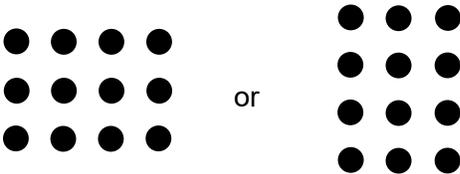
Representing multiplication with arrays



The product of two numbers will be shown using an array.
In doing so the children will identify the commutativity of multiplication.

Example

$4 \times 3 = ?$
A chew costs 4p. How much do 3 chews cost?



or

$4 \times 3 = 12$
and $3 \times 4 = 12$

Drawing sets gives the children an image of the answer. It also helps them to see that the numbers are reversible (commutative)

This stage begins to showcase how jottings are essential in mathematical problems.

Comparisons



Children will develop their ability to apply multiplication much more flexibly.

Example



Children will see that the longer ribbon is four times the length of the shorter, rather than 15cm longer.

Hundred squares



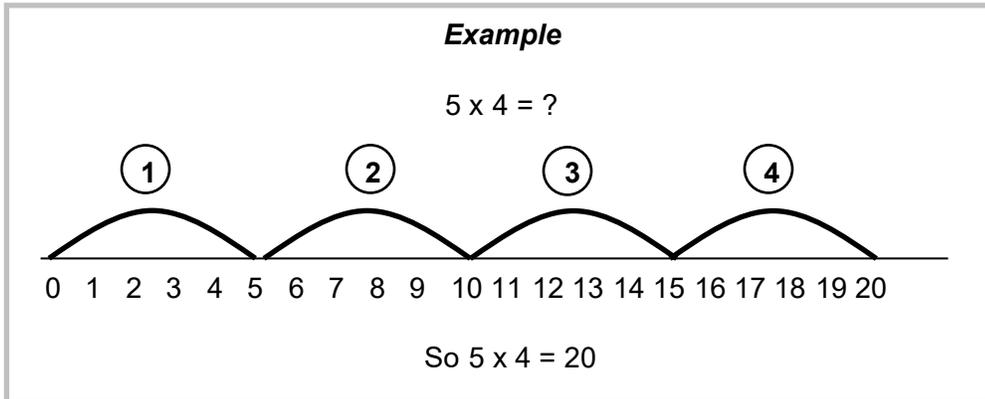
Children will notice patterns in hundred squares, as they begin to count up in different amounts. They will begin to identify which number will come next in a sequence.

This is an introduction to more formal 'times tables', which will be emphasised later in the school.

Number lines

2

The children will use a number line to help them to 'count up' in different amounts, much like in the repeated addition evidenced in the number arrays. This will initially be using marked number lines.



The children will be encouraged to jot down / highlight important numbers along the way, especially the number of 'jumps' they have done.

Vocabulary associated with multiplication



It is important for children to see that the solution to the questions '4x3' and '3x4' are identical.

However, in doing so we will emphasise that the actual representation of the two questions (through jottings or other models) are not. For example, '4x3' represents 3 'lots of' 4, whilst '3x4' asks for 4 'lots of' 3 items.

To tackle this situation the children will be introduced to the following signs.



(green triangle, red square, blue circle)

These symbols will be used to showcase the necessary importance upon each of the digits in a number sentence. They will also be manipulated to show the commutativity of multiplication, and how multiplication relates to division.

These symbols will be particularly emphasized in Years 2 3 and 4 as the children build upon their multiplication and division knowledge.

Partitioning numbers

3

Children will partition (break apart) each part of a large number, and then they will multiply each component to obtain a solution.

Example

$$124 \times 6 = ?$$

$$(100 \times 6) = 600$$

$$(20 \times 6) = 120$$

$$(4 \times 6) = 24$$

$$600 + 120 + 24 = 744$$

Grid method

The grid method will then be introduced.

Example

$$124 \times 6 = ?$$

124 books were sold. Each book cost £6. How much money was taken?

x	H	T	U	
	100	20	4	
6	600	120	24	= 744

124 is partitioned into 100, 20 and 4, and each part is multiplied by 6.

The three answers are then added together.

This method requires good understanding of times tables. As a result, a multiplication grid may need to be used at this stage.

Vertical method



This vertical method shows how '6 lots of 124' is the same as:
(6 lots of 4) + (6 lots of 20) + (6 lots of 100)

Example

$$\begin{array}{r} 124 \\ \times 6 \\ \hline 24 \quad (6 \times 4) \\ 120 \quad (6 \times 20) \\ \hline 600 \quad (6 \times 100) \\ 744 \end{array}$$

Extended grid method



Here the children will use the grid method for numbers, where both numbers are greater than 9.

Example

$$72 \times 34 = ?$$

An exercise book costs 72p.

How much would it cost for a class of 34 children?

x	70	2	
30	2100	60	= 2160
4	280	8	= <u>288</u>
			2448

Both numbers are partitioned into 'tens' and 'units', and then each part is multiplied together. The total for each row is then added, before finally finding a total of these values.

This method requires good understanding of times tables.

It does not matter which number is on the top, and which is down the side, of the grid.

Short multiplication



Short multiplication will then be introduced. This involves multiplying any whole number by a single digit number.

Example

$$46 \times 9 = ?$$

First, the 'unit' digit of 46 is multiplied by 9. As this results in a two-digit number, the 'tens' are then placed in the 'tens' column.

$$\begin{array}{r} 46 \\ \times 9 \\ \hline 4 \\ 5 \end{array}$$

Next, the 'tens' digit of 46 is multiplied by 9 (making 36 tens). Since there is also 5 tens in this column from the first step, these are added to the total. We now have 41 tens (410), which can also be written as 4 hundreds, and 1 ten.

$$\begin{array}{r} 46 \\ \times 9 \\ \hline 15 \\ 45 \end{array}$$

As there are no 'hundreds' digit in 46 to multiply by 9, we record a 4 in the hundreds column (this was from the last step).

$$\begin{array}{r} 46 \\ \times 9 \\ \hline 415 \\ 45 \end{array}$$

This method will initially be taught alongside the partitioning approach, however it is both more economical and quicker than the former method

If asked at any stage the children will be able to identify what each digit in a calculation represents (for example whether it represents so many 'hundreds', 'tens' or 'units').

Long multiplication



This strategy builds on the short multiplication method above, but this time introduces larger numbers being multiplied together (where both numbers are greater than 9)

Example

$$46 \times 19 = ?$$

$$\begin{array}{r} 46 \\ \times 19 \\ \hline \end{array}$$

Step 1: Multiply units x units	54	(6x9)
Step 2: Multiply tens x units	360	(40x9)
Step 3: Multiply units x tens	60	(6x10)
Step 4: Multiply tens x tens	<u>400</u>	(40x10)
Step 5: Add the answers together	<u>874</u>	
	1	

Once confident with this method, children will be shown how to combine steps 1 and 2, and steps 3 and 4 (see below).

To ensure its inclusion, the children will also be shown how they can record any 'carried' number by using a 'Just in case space' (a spare line just above the final total in Step 5)

Shorter multiplication methods



Example

$$46 \times 19 = ?$$

$$\begin{array}{r} 46 \\ \times 19 \\ \hline \end{array}$$

Step 1: Multiply top amount x units	414	(46x9)
Step 2: Multiply top amount x tens	<u>460</u>	(46x10)
Step 3: Add the answers together	<u>874</u>	

This step involves reducing the above method into two stages.